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High Voltage Aluminum Polymer Capacitors: LV and CV Series



Nichicon now offers high voltage aluminum electrolytic polymer capacitors. The current LV and CV family of polymer capacitors has been enhanced and are now available in 63 volts. For the radial leaded device, LV series, capacitance ranges from 22uF to 47uF. In the surface mount CV series, capacitance values of 5.6uF to 47uF are available.

There are key advantages to aluminum polymer capacitors:

Advantage #1: Low ESR

Polymer aluminum electrolytic capacitors offer very low ESR ratings versus standard aluminum electrolytic capacitors. Nichicon offers ESR ratings down to 5 milli-Ohms in other series in its family of polymer capacitors.

Advantage #2: Excellent Frequency Characteristic

Using the high conductivity of a functional polymer with an electrolyte, the ESR is greatly improved, obtaining the frequency characteristic nearly equal to a film capacitor.

Advantage #3: Usage with High Ripple Currents

Polymers have higher ripple current capability.

Advantage #4: Steady ESR and Capacitance

ESR and capacitance have steady characteristics over temperature change and a wide frequency range. At low temperatures, polymers are very reliable.

Advantage # 5: Cost Savings

One polymer capacitor has the same ripple current and ESR capabilities as 7 to 9 standard aluminum capacitors in parallel. This creates a great advantage in reducing cost and pc boards real estate!

LV and CV Product Offering

Nichicon's LV and CV family of polymer capacitors offers:

- Smaller overall case sizes and higher capacitance values than standard aluminum

Polymer Quick Facts

- Cost Effective
- Excellent Frequency Characteristics
- High Ripple Current Usage
- Excellent Ripple Voltage Smoothing
- Excellent Noise Absorption
- Reduces Board Placements
- Saves PC Real Estate
- Excellent Transient Response Capability
- Steady ESR and Capacitance
- Low ESR

electrolytics

- ESR ratings down to 23 milli-Ohms
- Radial-lead and surface-mount versions with many size options
- 3.5 or 5.0mm lead spacings
- 2.5V to 63V maximum Vdc ratings
- 5.6uF to 470uF capacitances
- Load life of 3000 hours at 105C
- High ripple currents up to 2900 mArm
- SMD type: Lead free reflow soldering condition at 260C peak

Markets

* DC-DC Converter for Automotive * LED Backlight * Industrial Equipment * AC-DC Power Supply for Personal Computer * Cellular Phone * General Household Goods * Outdoor and Indoor Wireless Equipment * General LED Applications *

Applications



There is a wide variety of applications for conductive polymer aluminum solid electrolytic capacitors and in this Tech Topic we have merely scratched the surface. We encourage you to contact your Nichicon Account Representative to assist you if you have any additional questions.

Filtering

Primary and secondary filtering for DC-DC converter and secondary filtering for switching power supply.

Noise Absorption

Noise absorption in the DC/DC Converter and Power Supply Line.

Smoothing

Smoothing of ripple voltage.

Data sheets for the LV and CV series are attached and also can be found on Nichicon's web site at www.nichicon.com.

LV series Radial Lead Type, Long Life Assurance



- High voltage (to 63V), Low ESR, High ripple current.
- Long life of 3000 hours at 105°C.
- Radial lead type:
Lead free flow soldering condition correspondence.
- Compliant to the RoHS directive (2002/95/EC).

LV High Voltage • Long Life **LF**



Specifications

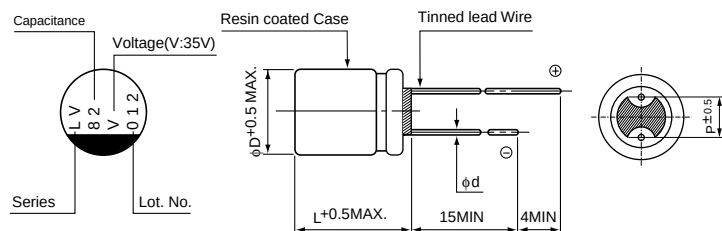
Item	Performance Characteristics		
Category Temperature Range	-55 to +105°C		
Rated Voltage Range	16 to 63V		
Rated Capacitance Range	22 to 470μF		
Capacitance Tolerance	±20% at 120Hz, 20°C		
Tangent of loss angle (tan δ)	Less than or equal to the specified value at 120Hz, 20°C		
ESR (※ 1)	Less than or equal to the specified value at 100kHz, 20°C		
Leakage Current (※ 2)	Less than or equal to the specified value. After 2 minutes' application of rated voltage at 20°C		
Temperature Characteristics (Max.Impedance Ratio)	Z+105°C / Z+20°C ≤ 1.25 (100kHz) Z-55°C / Z+20°C ≤ 1.25		
Endurance	The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 3000 hours at 105°C.	Capacitance change	Within ± 20% of the initial capacitance value (※ 3)
		tan δ	150% or less than the initial specified value
		ESR (※ 1)	150% or less than the initial specified value
		Leakage current (※ 2)	Less than or equal to the initial specified value
Damp Heat (Steady State)	The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 60°C, 90% RH.	Capacitance change	Within ± 20% of the initial capacitance value (※ 3)
		tan δ	150% or less than the initial specified value
		ESR (※ 1)	150% or less than the initial specified value
		Leakage current (※ 2)	Less than or equal to the initial specified value
Resistance to Soldering Heat	After soldering the capacitor under the soldering conditions prescribed here as preheat at 150 to 200°C for 60 to 180 seconds and peak temperature at 265°C for 10 seconds or less, the capacitor shall meet the specifications listed at right, provided that its temperature profile is measured at both of terminal ends facing the soldering side.	Capacitance change	Within ± 10% of the initial capacitance value (※ 3)
		tan δ	130% or less than the initial specified value
		ESR (※ 1)	130% or less than the initial specified value
		Leakage current (※ 2)	Less than or equal to the initial specified value
Marking	Navy blue print on the case top		

※ 1 ESR should be measured at both of the terminal ends closest to the capacitor body.

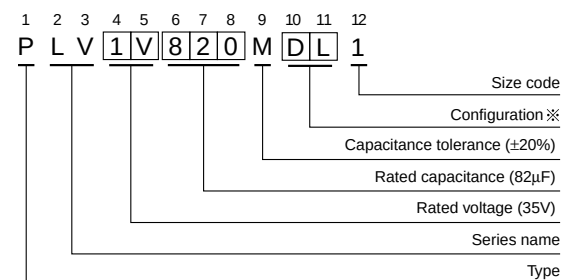
※ 2 Conditioning : If any doubt arises, measure the leakage current after the voltage treatment of applying DC rated voltage continuously to the capacitor for 120 minutes at 105°C.

※ 3 Initial value : The value before test of examination of resistance to soldering.

Dimensions



Type numbering system (Example : 35V 82μF)



(mm)			
Size	φ8 × 9L	φ8 × 12L	φ10 × 13L
φD	8.0	8.0	10.0
L	8.5	11.5	12.5
P	3.5	3.5	5.0
φd	0.6	0.6	0.6

Voltage

V	16	20	25	35	50	63
Code	C	D	E	V	H	J

※ Configuration

φ D × L	Code
8 × 9	CL
8 × 12	DL
10 × 13	DL

Please refer to page 20 about the end seal configuration.

● Dimension table in next page.



Standard Ratings

Rated Voltage (V) code	Surge Voltage (V)	Rated Capacitance (μ F)	Case Size ϕ D $\times$ L (mm)	$\tan \delta$	Leakage Current (μ A)	ESR (m Ω) (at 100kHz 20°C)	Rated Ripple (mA _{rms})	Part Number
16 (1C)	18.4	220	8 $\times$ 9	0.12	704	26	2100	PLV1C221MCL1
		270	8 $\times$ 12	0.12	864	24	2500	PLV1C271MDL1
		470	10 $\times$ 13	0.12	1504	23	2900	PLV1C471MDL1
20 (1D)	23.0	150	8 $\times$ 9	0.12	600	27	2000	PLV1D151MCL1
		220	8 $\times$ 12	0.12	880	25	2400	PLV1D221MDL1
		330	10 $\times$ 13	0.12	1320	24	2800	PLV1D331MDL1
25 (1E)	28.7	120	8 $\times$ 9	0.12	600	28	2000	PLV1E121MCL1
		150	8 $\times$ 12	0.12	750	26	2400	PLV1E151MDL1
		270	10 $\times$ 13	0.12	1350	25	2800	PLV1E271MDL1
35 (1V)	40.2	56	8 $\times$ 9	0.12	392	29	1900	PLV1V560MCL1
		82	8 $\times$ 12	0.12	574	27	2300	PLV1V820MDL1
		150	10 $\times$ 13	0.12	1050	26	2700	PLV1V151MDL1
50 (1H)	57.5	33	8 $\times$ 9	0.12	330	32	1900	PLV1H330MCL1
		39	8 $\times$ 12	0.12	390	29	2200	PLV1H390MDL1
		68	10 $\times$ 13	0.12	680	28	2600	PLV1H680MDL1
63 (1J)	72.4	22	8 $\times$ 9	0.12	277	35	1800	PLV1J220MCL1
		27	8 $\times$ 12	0.12	340	33	2100	PLV1J270MDL1
		47	10 $\times$ 13	0.12	592	29	2600	PLV1J470MDL1

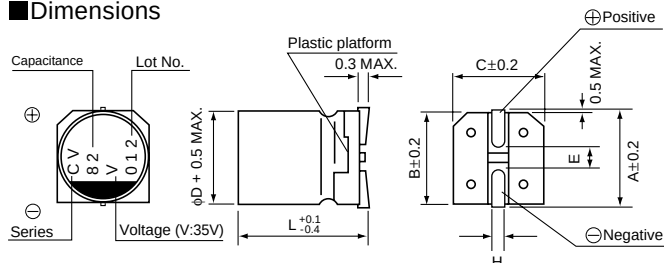
Rated ripple current (mA_{rms}) at 105°C 100kHz

- Taping specifications are given in page 20, 21, 22.
- Please refer to page 3 for the minimum order quantity.

- CV** ← High Voltage • Long Life **CF**



Item	Performance Characteristics		
Category Temperature Range	-55 to +105°C		
Rated Voltage Range	16 to 63V		
Rated Capacitance Range	5.6 to 470μF		
Capacitance Tolerance	± 20% at 120Hz, 20°C		
Tangent of loss angle (tan δ)	Less than or equal to the specified value at 120Hz, 20°C		
ESR (※ 1)	Less than or equal to the specified value at 100kHz, 20°C		
Leakage Current (※ 2)	Less than or equal to the specified value . After 2 minutes' application of rated voltage at 20°C		
Temperature Characteristics (Max.Impedance Ratio)	Z+105°C / Z+20°C ≤ 1.25 (100kHz) Z-55°C / Z+20°C ≤ 1.25		
Endurance	The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 3000 hours at 105°C.	Capacitance change	Within ± 20% of the initial capacitance value (※ 3)
		tan δ	150% or less than the initial specified value
		ESR (※ 1)	150% or less than the initial specified value
		Leakage current (※ 2)	Less than or equal to the initial specified value
Damp Heat (Steady State)	The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 60°C, 90% RH.	Capacitance change	Within ± 20% of the initial capacitance value (※ 3)
		tan δ	150% or less than the initial specified value
		ESR (※ 1)	150% or less than the initial specified value
		Leakage current (※ 2)	Less than or equal to the initial specified value
Resistance to Soldering Heat	After soldering the capacitor under the soldering conditions prescribed here, the capacitor shall meet the specifications listed at right, provided that it's temperature profile is measured at the capacitor top and the terminal. Pre-heating shall be done at 150 to 200°C and for 60 to 180 sec. The duration for over +230°C temperature at capacitor surface shall not exceed 60 seconds. In the case of peak temp, less than 250°C, reflow soldering shall be two times maximum. In the case of peak temp, less than 260°C, reflow soldering shall be once. Measurement for solder temperature profile shall be made at the capacitor top and the terminal.	Capacitance change	Within ± 10% of the initial capacitance value (※ 3)
		tan δ	130% or less than the initial specified value
		ESR (※ 1)	130% or less than the initial specified value
		Leakage current (※ 2)	Less than or equal to the initial specified value
Marking	Navy blue print on the case top		



1 2 3 4 5 6 7 8 9 10 11 12 13 14

P C V **1** V **8** **2** **0** M C L **1** G S

Type

Series name (35V)

Rated voltage (35V)

Rated capacitance (82μF)

Capacitance tolerance (±20%)

Configuration

Size code

Taping code

	(mm)						
Size	φ6.3×6L	φ8×7L	φ8×10L	φ8×12L	φ10×8L	φ10×10L	φ10×12.7L
φD	6.3	8.0	8.0	8.0	10.0	10.0	10.0
L	5.9	6.9	9.9	11.9	7.9	9.9	12.6
A	7.3	9.0	9.0	9.0	11.0	11.0	11.0
B	6.6	8.3	8.3	8.3	10.3	10.3	10.3
C	6.6	8.3	8.3	8.3	10.3	10.3	10.3
E	2.1	3.2	3.2	3.2	4.6	4.6	4.6
H	0.5 to 0.8	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1

Voltage						
V	16	20	25	35	50	63
Code	C	D	E	V	H	J



Standard Ratings

Rated Voltage (V)(code)	Surge Voltage (V)	Rated Capacitance (μF)	Case Size φD × L (mm)	tan δ	Leakage Current (μA)	ESR (mΩ) (at 100kHz 20°C)	Rated Ripple (mArms)	Part Number
16 (1C)	18.4	56	6.3 × 6	0.12	179	50	1000	PCV1C560MCL1GS
		100	8 × 7	0.12	320	36	1500	PCV1C101MCL1GS
		220	▲ 8 × 10	0.12	704	27	2000	PCV1C221MCL6GS
		220	10 × 8	0.12	704	31	2000	PCV1C221MCL1GS
		270	8 × 12	0.12	864	26	2300	PCV1C271MCL1GS
		330	10 × 10	0.12	1056	26	2400	PCV1C331MCL1GS
		470	10 × 12.7	0.12	1504	25	2800	PCV1C471MCL1GS
20 (1D)	23.0	47	6.3 × 6	0.12	188	55	1000	PCV1D470MCL1GS
		68	8 × 7	0.12	272	45	1300	PCV1D680MCL1GS
		150	▲ 8 × 10	0.12	600	28	2000	PCV1D151MCL6GS
		150	10 × 8	0.12	600	33	1900	PCV1D151MCL1GS
		220	8 × 12	0.12	880	27	2300	PCV1D221MCL1GS
		270	10 × 10	0.12	1080	27	2300	PCV1D271MCL1GS
		330	10 × 12.7	0.12	1320	26	2700	PCV1D331MCL1GS
25 (1E)	28.7	33	6.3 × 6	0.12	165	60	900	PCV1E330MCL1GS
		56	8 × 7	0.12	280	50	1300	PCV1E560MCL1GS
		120	▲ 8 × 10	0.12	600	29	1900	PCV1E121MCL6GS
		120	10 × 8	0.12	600	35	1800	PCV1E121MCL1GS
		150	8 × 12	0.12	750	28	2200	PCV1E151MCL1GS
		180	10 × 10	0.12	900	28	2300	PCV1E181MCL1GS
		270	10 × 12.7	0.12	1350	27	2700	PCV1E271MCL1GS
35 (1V)	40.2	18	6.3 × 6	0.12	126	64	900	PCV1V180MCL1GS
		27	8 × 7	0.12	189	55	1200	PCV1V270MCL1GS
		56	8 × 10	0.12	392	31	1900	PCV1V560MCL1GS
		68	10 × 8	0.12	476	37	1800	PCV1V680MCL1GS
		82	8 × 12	0.12	574	29	2200	PCV1V820MCL1GS
		100	10 × 10	0.12	700	29	2200	PCV1V101MCL1GS
		150	10 × 12.7	0.12	1050	28	2600	PCV1V151MCL1GS
50 (1H)	57.5	8.2	6.3 × 6	0.12	82	81	800	PCV1H8R2MCL1GS
		15	8 × 7	0.12	150	63	1100	PCV1H150MCL1GS
		33	▲ 8 × 10	0.12	330	36	1700	PCV1H330MCL6GS
		33	10 × 8	0.12	330	49	1500	PCV1H330MCL1GS
		39	8 × 12	0.12	390	34	2000	PCV1H390MCL1GS
		47	10 × 10	0.12	470	30	2200	PCV1H470MCL1GS
		68	10 × 12.7	0.12	680	29	2600	PCV1H680MCL1GS
63 (1J)	72.4	5.6	6.3 × 6	0.12	71	105	700	PCV1J5R6MCL1GS
		10	8 × 7	0.12	126	75	1000	PCV1J100MCL1GS
		22	▲ 8 × 10	0.12	277	37	1700	PCV1J220MCL6GS
		22	10 × 8	0.12	277	56	1400	PCV1J220MCL1GS
		27	8 × 12	0.12	340	35	2000	PCV1J270MCL1GS
		33	10 × 10	0.12	416	31	2200	PCV1J330MCL1GS
		47	10 × 12.7	0.12	592	30	2500	PCV1J470MCL1GS

Rated ripple current (mArms) at 105°C 100kHz

No marked, [1] will be put at 12th digit of type numbering system.

▲: In this case, [6] will be put at 12th digit of type numbering system.

- Taping specifications are given in page 23.
- Recommended land size, soldering by reflow are given in page 18, 19.
- Please refer to page 3 for the minimum order quantity.